Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original) A therapeutic radiation source, comprising:

A. a radiation generator assembly, comprising:

a. an electron source for emitting electrons to generate an electron beam along a beam path, said electron source including a thermionic cathode having an electron emissive surface, and

b. a target positioned in said beam path, said target including means for emitting therapeutic radiation in response to incident accelerated electrons from said electron beam; wherein said thermionic cathode comprises a spiral-shaped conductive element;

B. a source of optical radiation; and

C. optical delivery structure having an originating end and a terminating end and adapted for transmitting to said terminating end optical radiation generated by said source and incident on said originating end; and wherein said optical delivery structure are adapted for directing a beam of said transmitted optical radiation upon a surface of said thermionic cathode; and wherein said beam of optical radiation has a power level sufficient to heat at least a portion of said surface to an electron emitting temperature so as to cause thermionic emission of electrons from said surface.

2. (Original) A therapeutic radiation source according to claim 1, further comprising: a substantially rigid housing enclosing said thermionic cathode and said target, wherein said housing defines a substantially evacuated interior region extending along said beam path between a proximal end and a distal end of said housing.

3. (Original) A therapeutic radiation source according to claim 1, wherein said thermionic cathode is disposed at said input end of said housing.

4. (Original) A therapeutic radiation source according to claim 1, further comprising a radiation transmissive window at an output end of said housing, wherein therapeutic radiation emitted from said target is directed through said radiation transmissive window.

5. (Original) A therapeutic radiation source according to claim 1, wherein said spiral-shaped conductive element defines a plurality of spaced apart turns.

6. (Original) A therapeutic radiation source according to claim 5, wherein said conductive element defines an interstitial space between each successive turn.

7. (Original) A therapeutic radiation source according to claim 5, wherein said spiral-shaped conductive element forms a planar coil.

8. (Original) A therapeutic radiation source according to claim 5, wherein said spiral-shaped conductive element forms a helical coil.

9. (Currently Amended) A therapeutic radiation source according to claim 5, wherein the distance between adjacent turns of said ~~conductive coil~~ spiral-shaped conductive element is from about 25 microns to about 50 microns.

10. (Original) A therapeutic radiation source according to claim 5, wherein each of said plurality of spaced apart turns has a transverse sectional shape that is substantially circular.

11. (Original) A therapeutic radiation source according to claim 1, wherein said optical delivery structure comprises a fiber optical cable.

12. (Original) A therapeutic radiation source according to claim 1, wherein said fiber optical cable has a diameter between about 100 microns to about 200 microns.

13. (Currently Amended) A therapeutic radiation source according to claim 5, wherein said spiral-shaped conductive [[coil]] element has a length between about 2 mm to about 7 mm.

14. (Original) A therapeutic radiation source according to claim 1, wherein the power required for heating said electron emissive surface of said cathode so as to generate an electron beam forming a current of about 2 micro amps is between about 0.1 Watt to about 1.0 Watt.

15. (Original) A therapeutic radiation source according to claim 1, wherein said optical source is a laser, and wherein said beam of optical radiation is substantially monochromatic and coherent.

16. (Original) A therapeutic radiation source according to claim 1, wherein said therapeutic radiation comprises x-rays.

17. (Original) A therapeutic radiation source according to claim 1, wherein power loss caused by thermal conduction is less than 0.2 Watts.

18. (Original) A therapeutic radiation source according to claim 17, wherein heat transfer across the spacing between each adjacent turn of said conductive element is essentially eliminated, thereby substantially reducing in said thermionic cathode heat loss caused by thermal conduction.

19. (Original) A therapeutic radiation source according to claim 1, further including means for establishing an accelerating electric field which acts to accelerate electrons emitted from said electron source toward said target.

20. (Original) A therapeutic radiation source according to claim 19, wherein said means for establishing an accelerating electric field is a power supply.

21. (Original) A therapeutic radiation source, comprising:

A. a radiation generator assembly, comprising:

a. an electron source for emitting electrons to generate an electron beam along a beam path, said electron source including a thermionic cathode having an electron emissive surface, and

b. a target positioned in said beam path, said target including means for emitting therapeutic radiation in response to incident accelerated electrons from said electron beam; and

c. a substantially rigid housing enclosing said thermionic cathode and said target, wherein said housing defines a substantially evacuated interior region extending along said beam path between an input end and an output end of said housing.

B. a source of optical radiation; and

C. optical delivery structure having an originating end and a terminating end and adapted for transmitting to said terminating end optical radiation generated by said source and incident on said originating end, said optical delivery structure being adapted for directing a beam of said transmitted optical radiation upon a surface of said thermionic cathode, wherein said beam of optical radiation has a power level sufficient to heat at least a portion of said surface to an electron emitting temperature so as to cause thermionic emission of electrons from said surface; and wherein said thermionic cathode comprises a spiral-shaped conductive element having a plurality of spaced apart turns.

22. (Previously Presented) A probe having a radiation source at a distal end, comprising:

A. a probe assembly including an optical delivery structure adapted for transmitting optical radiation;

B. an optical source for generating optical radiation directed to an end of said optical delivery structure;

C. a radiation source coupled to a distal end of said optical delivery structure, said radiation source comprising a thermionic cathode and a target element;

a. wherein the thermionic cathode is responsive to said optical radiation transmitted to said distal end to emit electrons, and wherein said thermionic cathode comprises a spiral-shaped conductive element; and

b. wherein said target element is responsive to incident electrons emitted from said thermionic cathode to emit radiation;

D. means for establishing an accelerating electric field extending between said electron source toward said target element, the electric field being effective to accelerate electrons emitted from the thermionic cathode toward said target element;

Wherein said optical delivery structure is adapted to direct a beam of optical radiation transmitted therethrough to impinge upon a surface of the thermionic cathode, and wherein said beam of transmitted optical radiation has a power level sufficient to heat at least a portion of said surface to an electron emitting temperature so as to cause thermionic emission of electrons from said surface.

23. (Previously Presented) A probe in accordance with claim 22, wherein said optical source comprises a laser.

24. (Previously Presented) A probe in accordance with claim 22, wherein said radiation source comprises an x-ray source, and said radiation emitted from said target element comprises x-rays.

25. (Previously Presented) A probe in accordance with claim 22, wherein said optical delivery structure comprises a fiber optic cable.

26. (Previously Presented) A probe in accordance with claim 22, wherein said radiation source comprises a substantially rigid housing enclosing said thermionic cathode and said target

element, wherein said housing defines a substantially evacuated interior region extending along said beam path between a proximal end and a distal end of said housing.

27. (Previously Presented) A probe in accordance with claim 22, wherein said spiral-shaped conductive element defines a plurality of spaced apart turns with an interstitial space between each successive turn.

28. (Previously Presented) A probe in accordance with claim 22, wherein said spiral-shaped conductive element forms one of a planar coil and a helical coil.

29. (Previously Presented) A radiation source, comprising:

A. a probe assembly including an optical delivery structure, said optical delivery structure being adapted for transmitting optical radiation incident on a proximal end thereof to a distal end thereof;

B. an optical source for generating a beam of optical radiation directed to said proximal end of said optical delivery structure;

C. a radiation generator assembly coupled to said probe assembly, including:

a. an electron source, responsive to optical radiation transmitted to said distal end of said optical delivery structure, for emitting electrons, the electron source including a thermionic cathode having an electron emissive surface; wherein said

b. a target element including at least one radiation emissive material adapted to emit radiation in response to incident accelerated electrons from said electron source; and

D. means for providing an accelerating voltage between said electron source and said target element so as to establish an accelerating electric field which acts to accelerate electrons emitted from said electron source toward said target element;

wherein said optical delivery structured is adapted for directing a beam of optical radiation transmitted therethrough to impinge upon a surface of said thermionic cathode, and wherein said beam of transmitted optical radiation has a power level sufficient to heat at least a portion of said

surface to an electron emitting temperature so as to cause thermionic emission of electrons from said surface.

30. (Previously Presented) A flexible probe having an x-ray tube as a distal end, comprising:

A. an optical source for generating optical radiation,

B. a flexible optical fiber having a proximal end and a distal end, and adapted fro transmitting optical radiation incident on said proximal end to said distal end;

C. an x-ray tube coupled to a distal end of said optical fiber, comprising a substantially rigid housing enclosing a thermionic cathode and an x-ray target,

a. wherein the thermionic cathode is responsive to said optical radiation transmitted to said distal end to emit electrons; wherein said thermionic cathode comprises a spiral-shaped conductive element; and

b. wherein said x-ray target is responsive to incident electrons emitted from said thermionic cathode to emit x-rays;

D. means for establishing an electric field to accelerate electrons emitted from the thermionic cathode toward said x-ray target;

wherein said optical fiber is adapted to direct a beam of optical radiation transmitted therethrough to impinge upon a surface of the thermionic cathode, and wherein said beam of transmitted optical radiation has a power level sufficient to heat at least a portion of said surface to an electron emitting temperature so as to cause thermionic emission of electrons from said surface.